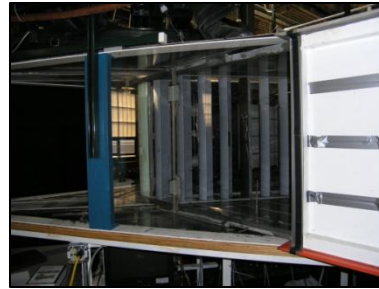


## Low Speed Wind Tunnel Facility (LSWTF)



### Description:

This facility consists of a large-scale, low-speed open-loop induction wind tunnel which has been modified to house a linear turbine cascade. A 125-hp electric motor powers an axial flow fan, drawing air at velocities up to 80m/s through an 85 cm by 122 cm test section. The entrance to the tunnel consists of a 3.0 m by 2.7 m rectangular bell-mouth inlet. Honeycomb flow straighteners located in the inlet, combined with a gradual 8:1 area contraction; produce a uniform, low turbulence velocity profile at the cascade. Flow velocity uniformity is within  $\pm 1\%$  with approximately 0.5% freestream turbulence. This level of turbulence can be augmented through the use of a turbulence generating grid which produces freestream turbulence levels of approximately 4% at the cascade. The grid may also be fed with high-pressure air to produce turbulence levels of up to 15%. The inlet and test section pivot independently of the exit section, allowing the cascade inlet and exit to be set independently between  $0^\circ$  and  $65^\circ$ , allowing a total cascade turning of between  $0^\circ$  and  $130^\circ$ . The cascade is modular and can accommodate 85 cm span blades of up to 20 cm axial chord. A moving bar wake generator is available to provide periodic upstream unsteadiness over a wide range of reduced frequencies and flow coefficients. A modular splitter plate assembly may also be installed to allow the study of end-wall flows with controlled wall boundary layer conditions. Available instrumentation includes thermocouples, pressure probes, thermal anemometry, and Particle Image Velocimetry. Access is also available for use of a wide range of optical instrumentation techniques.

### Purpose:

This facility is used to perform studies of turbine aerodynamics and flow control.

### Products:

Low Reynolds number and high loading turbine component aerodynamics data.  
Data on the effects of periodic unsteadiness on turbine performance.  
Flow control data for application to turbine component design.

### Availability:

Primarily in-house and related DoD contractor research. Other U.S. Government agency, DoD contractor and commercial customer programs upon request. Contact: 937-255-2367.